Beef Cattle: Housing

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INTRODUCTION

Cattle are among the most hardy domestic species with respect to climatic conditions. It has been shown that the lower critical temperature of a beef animal on feed is below −20°C and upper threshold as high as 25 to 30°C, depending on associated humidity, thermal radiation, and wind speed. So why consider housing for beef cattle? If selected, what features should be considered? These issues are addressed in this article.

ENVIRONMENTAL TEMPERATURE TOLERANCE

Full-fed beef animals have a very high tolerance for cold temperatures.[1–3] This is illustrated by the story of feeder cattle brought into a loafing barn for routine observations before noon one day, and later found to be strangely affected by some unknown condition. A virulent disease was feared and the animals were moved outside and isolated for observation, where they quickly recovered. The unknown condition was heat stress, and the stressful temperature was 0°C. The animals had become acclimated to −30°C over the previous month, which demonstrates adaptability and acclimation. A second story involves more than 5000 cattle that died in northeastern Nebraska during a 1999 two-day heat wave.[4] When studying some of the affected feedyards seven days later, we found very few animals in distress, even though climatic conditions were more severe than the area had experienced during the heat wave. Again, adaptation and acclimation were factors. Both stories demonstrate a climatic stressor that may be more important than temperature alone: extreme variability of thermal conditions.

COLD WEATHER HOUSING

The heat and moisture production and manure generation of cattle combine to make ventilation primary in design of beef housing, regardless of climatic conditions. Adequate ventilation in cold climates means removal of moisture generated by respiration and evaporated from urine and feces. Given the limited moisture-holding capacity of cold air, insulation of the structure is important to limit condensation.

The performance advantage for housing beef in cold climates results from blocking wind, precipitation, and accumulation of snow.[2,5–8] For very cold climates, warm housing may be economically feasible, but results have been mixed.

Regardless of climatic conditions or type of structure, effective separation of accumulated waste from the animal is the key to comfort and sanitation. Concerns over odor issues have heightened interest in housing beef animals as a tool for reducing and/or controlling odor and nitrogen volatilization.[9] The value of this management practice is not fully known and requires additional research. Floor design, space, and diet formulation are critical elements of proper manure management.

FLOOR DESIGN

Floor design requires draining liquids from the surface as quickly as possible to limit evaporation and odor generation. Firm surfaces and the absence of deep mud are important factors in beef confinement.[10] Flooring types range from dirt to concrete to slats over pits. Although least complex in construction and least expensive, dirt and/or concrete require the most maintenance to provide sanitary conditions, and require some type of bedding or very low stocking density. When pen space is limited (<2.5 m^2/head), and animals are confined to the barn, a deep storage manure pit covered with slats provides a suitable surface without frequent maintenance.[7] If the deep pit option is selected, extreme caution must be taken because hazardous gases may be emitted from the pit and affect environment within the pit and structure during pump-out. To prevent asphyxiation and possible death, no human should ever enter pit without an approved self-contained breathing apparatus and harness, with at least two people outside the pit with a rescue line. Animals should be removed from the structure during pump-out.[11]

DIET FORMULATION

Diet formulation is critical because characteristics of manure reflect diet roughage level.[12] As digestibility

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